

1           1.    A method comprising:  
2                blanket depositing a mobility enhancing silicon  
3 material over a region of a semiconductor substrate to form  
4 amorphous and crystalline films; and  
5                selectively removing an amorphous film without  
6 substantially removing the crystalline film.

1           2.    The method of claim 1 including blanket  
2 depositing a material to enhance compressive strain.

1           3.    The method of claim 1 including blanket  
2 depositing a material to enhance tensile strain.

1           4.    The method of claim 1 including blanket  
2 depositing a carbon doped silicon material.

1           5.    The method of claim 1 including blanket  
2 depositing a boron doped silicon material.

1           6.    The method of claim 1 wherein selectively  
2 removing includes etching in the presence of sonication.

1           7.    The method of claim 6 including etching using  
2 tetramethylammonium.

1           8.    The method of claim 6 including etching using  
2   NH<sub>4</sub>OH.

1           9.    The method of claim 1 wherein blanket depositing  
2   includes depositing using trisilane.

1           10.   The method of claim 9 including depositing using  
2   trisilane at a temperature less than 550°C.

1           11.   The method of claim 1 including forming a  
2   strained channel NMOS transistor.

1           12.   The method of claim 1 including forming a  
2   strained channel PMOS transistor.

1           13.   The method of claim 1 including removing ion  
2   implanted source/drain regions and blanket depositing a  
3   mobility enhancing silicon material over said removed  
4   source/drain regions and over gate electrode regions.

1           14.   A semiconductor structure comprising:  
2                a semiconductor substrate;  
3                a gate structure formed over said substrate; and  
4                a film of mobility enhancing material formed over  
5   said substrate and said gate structure, said film being

6 amorphous over said gate structure and crystalline over  
7 said semiconductor substrate.

1 15. The structure of claim 14 wherein said film is  
2 carbon doped.

1 16. The structure of claim 14 wherein said film is  
2 boron doped.

1 17. The structure of claim 14 wherein said film  
2 includes trisilane.

1 18. The structure of claim 14, said substrate  
2 including depressions, filled with said film, on either  
3 side of said gate structure.

1 19. A method comprising:  
2 removing implanted source/drain regions on either  
3 side of a gate structure;  
4 forming a crystalline film over said substrate  
5 where said source/drain regions were removed; and  
6 forming an amorphous film over said gate  
7 structure.

1        20. The method of claim 19 including depositing a  
2 carbon doped silicon material to form said amorphous and  
3 crystalline films.

1        21. The method of claim 19 including selectively  
2 removing the amorphous film without substantially removing  
3 the crystalline film.

1        22. The method of claim 21 wherein selectively  
2 removing includes etching in the presence of sonication.

1        23. The method of claim 22 including etching using  
2 tetramethylammonium.

1        24. The method of claim 22 including etching using  
2  $\text{NH}_4\text{OH}$ .

1        25. The method of claim 19 wherein said films are  
2 formed by depositing a silicon layer using trisilane at a  
3 temperature less than  $550^\circ\text{C}$ .

1        26. A method comprising:  
2            forming a film of mobility enhancing material  
3 over a semiconductor substrate and over a gate electrode  
4 structure; and

5               selectively etching the material over the gate  
6 electrode structure without substantially etching the  
7 material over the substrate.

1           27. The method of claim 26 including blanket  
2 depositing said material to enhance compressive strain.

1           28. The method of claim 26 including blanket  
2 depositing said material to enhance tensile strain.

1           29. The method of claim 26 wherein selectively  
2 etching includes etching in the presence of sonication.

1           30. The method of claim 29 including depositing said  
2 material using trisilane at a temperature less than 550°C.

1           31. The method of claim 26 including removing ion  
2 implanted source/drain regions and blanket depositing a  
3 mobility enhancing silicon material over said removed  
4 source/drain regions and over gate electrode regions.

1           32. The method of claim 31 including depositing a  
2 carbon doped silicon to form amorphous and crystalline  
3 films.